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EFFICIENCY OF THE GREAT EQUATORIAL.

The following extract from a paper by Mr. KEELER summarizes the opinions of the astronomers of the Lick Observatory upon the performance of the Great Telescope, and may be of general interest :

* * * * "As the large telescope has now been sufficiently long in use for a thorough test of its various qualities, it may be worth while to give a brief summary of the different kinds of work in which it has proved to be effective.

"*Separation and measurement of close double stars*, as attested by the long list of new doubles, and micrometer measurements of these and of difficult pairs already known, published by Mr. BURNHAM.*

"*Detection of very faint stars*. Professor HOLDEN and Mr. SCHAEFERLE have observed six stars within the dark interior space of the ring nebula in *Lyra*, besides the central one (No. 14 of LASSELL'S drawing), and five more within the nebulosity,† and of all these, only the central one was previously known. An example of a double star with extremely minute components, discovered with this telescope, is the pair preceding the trapezium in the nebula of *Orion*.‡ It was found by Mr. BARNARD; and Mr. BURNHAM, who measured it, considers it the most difficult pair with which he is acquainted in the whole heavens.

"In this connection may also be mentioned the observations of the satellites of *Mars*,§ made here during the opposition of 1888. When *Mars* was in opposition the satellites were easy objects, being plainly visible without the aid of an occulting bar to hide the planet, and they were seen as late as July 18th, when their brightness was only 0.12 of that at the time of their discovery in 1877.

"*Observations of the structure of nebulae*. The *Lyra* nebula has already been mentioned under the preceding division, but only in relation to the minute stars which appear in it. The structure of the nebula itself was better seen by Professor HOLDEN with this instrument than with any other that he had used. He says: 'One's first idea is not so much that the aspect is unfamiliar as that it is distinctly different; that its simple structure has suddenly become com-

* *Astronomische Nachrichten*, (Nos. 2929 and 2930).

† *Monthly Notices*, R. A. S. (Vol. XLVIII, No. 383).

‡ *Monthly Notices*, R. A. S. (Vol. XLIX, No. 6).

§ *Astronomical Journal*, (No. 178).

plex; and, finally, that the task of depicting it completely is practically impossible by the ordinary methods".* The observations which show the probable existence of helical forms in the nebulæ† should also be mentioned.

"*Observations of comets.* The companions of BROOKS' comet have been observed and measured during the past few months by Mr. BARNARD, who finds a considerable advantage in the thirty-six-inch over the twelve-inch refractor.‡ With the latter instrument the faint companions, called by Mr. BARNARD *D* and *E*, were at all times invisible, although for blackness of field and excellence of definition the twelve-inch telescope is unsurpassed. They have not been seen elsewhere.

"*Definition of the surface features of a planet.* The views of *Jupiter* obtained here during the past opposition have sufficiently proved to all the observers that the large telescope is as suitable for the observation of planetary details as for the other classes of work above given. The extremely fine division discovered by the writer, in the outer ring of *Saturn*, outside of the ENCKE shading,§ has been seen by all the observers here on numerous occasions, but, so far as I am aware, it has been seen at no other place. Finally, I may refer to observations by Professor HOLDEN, not yet published, on details seen in specially interesting parts of the lunar surface.

"These different classes of astronomical work essentially cover the field of visual observation, and in all the thirty-six-inch refractor has shown its capability of yielding the best results." J. E. K.

THE COMPANION TO THE *OBSERVATORY*.

The companion to the *Observatory*, for 1890, has just been issued, and it may be obtained through B. WESTERMANN & CO. (Box 2306, New York City), for 1s. 6d. It is indispensable to amateur observers, and quite takes the place of the *Nautical Almanac* for most work. It contains ephemerides of the sun, moon, planets and satellites; a list of the principal meteor showers of the year; a list of occultations (for Greenwich); together with full particulars regarding variable and double stars. E. S. H.

* *Monthly Notices of the R. A. S.* (Vol. XLVIII, No. 9, p. 385).

† *Publications of the Astronomical Society of the Pacific*, (No. 3), and *Himmel und Erde*, (October, 1889).

‡ *Astronomische Nachrichten*, (No. 2919).

§ *Siderzal Messenger*, (No. 62); *Astronomical Journal*, (No. 190); *Ciel et Terre*, (2e serie, t. V., 1889).